Roadmap of ELFT
Past, Present, and Future...

Vladimir Dvornychenko

NIST

vdvorny@nist.gov
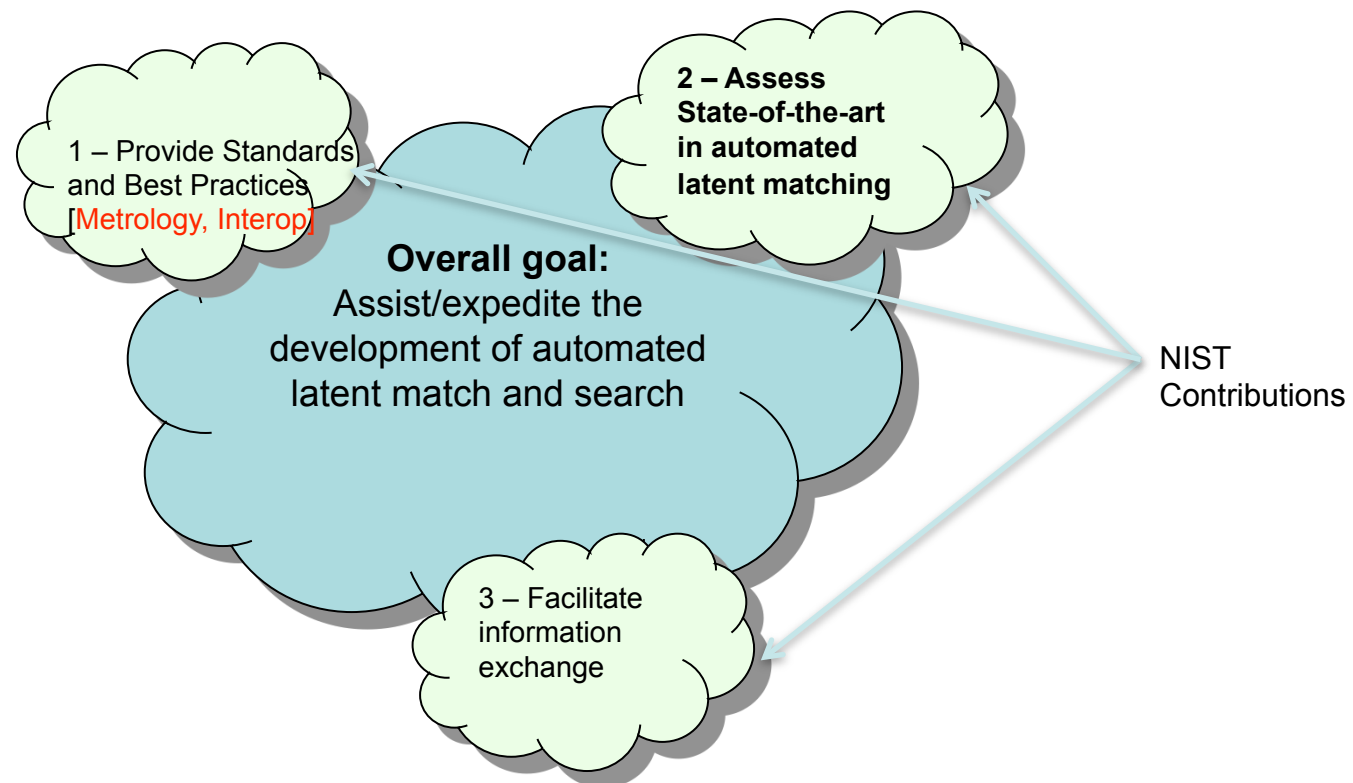
(301) 975-2939

Chronology

Fingerprint Community

- 1940 – FBI evaluates early automation in the form of card sorters
- 1970s – Rockwell, Autonetics Div. performs pioneering work in automated fingerprint matching (evolves to become Printrak division)
- 1975 –First automated fingerprint matcher sold (Printrak)
- 1987 – FBI Identification Division's Automated Services (IDAS) becomes operational
- 1995 – It is determined automated classification is sufficiently mature to pose low risk for IAFIS
- 1999 – IAFIS goes online
- Ongoing NGI development

NIST

- 1960s – Early work by Ray Moore and Joseph Wegstein
- 1969 – Following a two-year study, NIST determines that a minutiae-based automatic matcher is technically feasible
- 2003 –The Fingerprint Vendor Technology Evaluation (FpVTE) – first major fingerprint test conducted by NIST
- 2006 (April) – First NIST Latent Workshop
- 2006 (Nov) – ELFT07 initiated
- 2006 (Dec) –ELFT07 Concept of Operations (CONOPS) drafted
- 2007 (April) – Phase I Testing begins
- 2008 (April) –Phase II Testing begins
- 2009 (March) – Second Latent Workshop

The overall goal: to assist and expedite the development of automated latent matching and searching technology

1 – Provide Standards and Best Practices [Metrology, Interop]

2 – Assess State-of-the-art in automated latent matching

Overall goal: Assist/expedite the development of automated latent match and search

NIST Contributions

3 – Facilitate information exchange

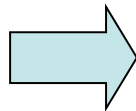# The overall goals of ELFT are to advance automation for latent searches
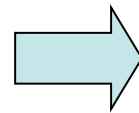
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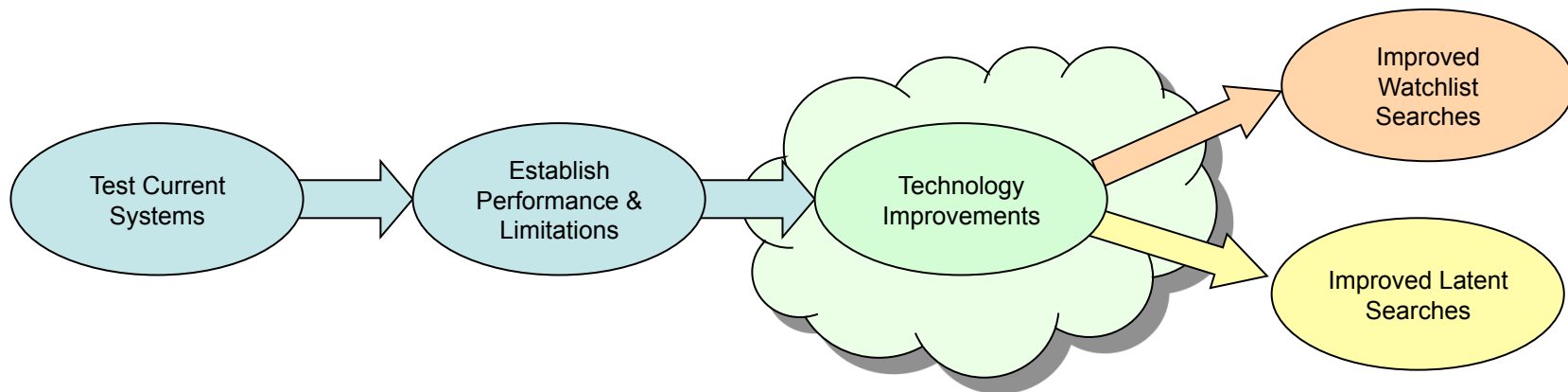
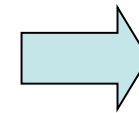# Steps that comprise a latent performance test

**Publish
Concept of Operations
(CONOPS)
and Software API.
Create and maintain
Website.**

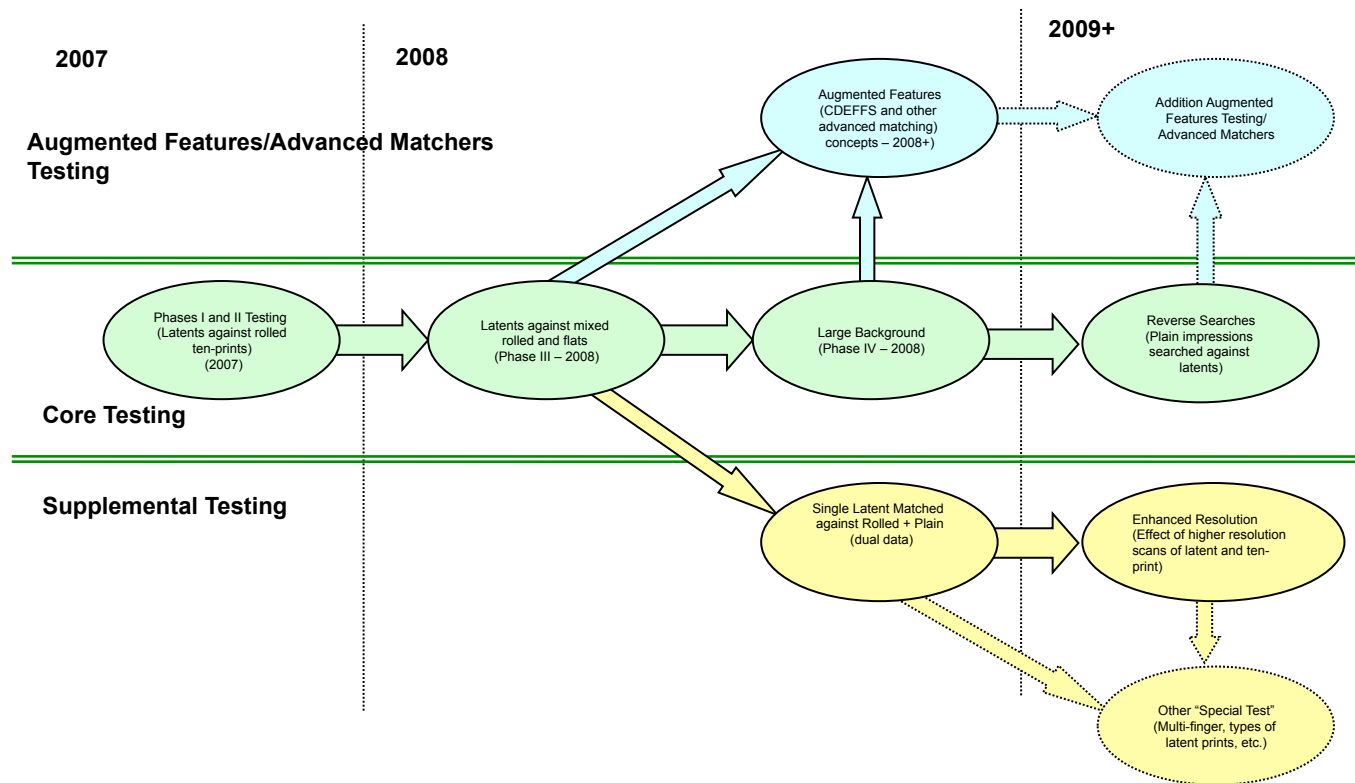**Create/Compile
Latent Test Sets**

**Phases I and II Tests --Execute submitted
Software (SDK)
using NIST Computers and Test Sets.**

**Analyze Data.
Conduct Follow-up
Workshop.
Present results.
Discuss future
Work.**

Possible directions for ELFT as originally envisioned

2007　　　**2008**　　　　　　　　　　　　　　　　　　**2009+**

Augmented Features/Advanced Matchers Testing

Augmented Features (CDEFFS and other advanced matching) concepts – 2008+)

Addition Augmented Features Testing/ Advanced Matchers

Phases I and II Testing (Latents against rolled ten-prints) (2007)

Latents against mixed rolled and flats (Phase III – 2008)

Large Background (Phase IV – 2008)

Reverse Searches (Plain impressions searched against latents)

Core Testing

Supplemental Testing

Single Latent Matched against Rolled + Plain (dual data)

Enhanced Resolution (Effect of higher resolution scans of latent and ten-print)

Other "Special Test" (Multi-finger, types of latent prints, etc.)

Automated feature extraction and matching --AFEM

- It is important to distinguish AFEM-based latent fingerprint identification from the general concept of *lights-out identification.*

- *Lights-out* identification refers to a system requiring minimal or zero human assistance in which an image is presented as input, and the output consists of a short candidate list.

- AFEM emphasizes the "front end" automated feature extraction, and does fully address the "back end" candidate list reduction

- ELFT emphasizes AFEM – but includes steps toward candidate list reduction

ELFT Phases I and II

o Series of tests initiated in 2007 (workshop '06)

- Eleven participants (all commercial) to date

o **Phase I (2007)**

- "proof of concept" (100 latents)
- Public report (aggregate results, anonymous)
- Individualized vendor reports (detailed results)

o **Phase II (2008)**

- Operational images (800+ latents)
- Core results to participants (March 2009)
- Final Report (to be released)

ELFT-EFS Objectives

Evaluates:

o **Accuracy of examiner-assisted searches**

- Effectiveness of examiner selected features (EFS)
- Features defined by CDEFFS
  (proposed addendum to ANSI-NIST-ITL 1-2007)
- Performance of image+EFS, EFS, and image (i.e. AFEM) as baseline

o **Interoperability of standardized Extended Feature Sets**

- Repeatability of examiner markup?
- Which features "work" across multiple matchers?

ELFT-EFS Test Plan

o Two tests announced in November 2008

o **Test I (March 2009 – Kick off workshop)**

- "challenge problem" (take home test)
- SD27-1000 (with "juried" EFS markup) and SD30
- EFS supp. CDEFFS devel. (prop. mods to ANSI/NIST)

o **Test II (Spring-Summer '09)**

- Sequestered images
- *SDK test executed by NIST & Noblis*
- *Includes an image-only (AFEM) test*

Future Directions

- Automatic determination of matching method (AFEM or human-assisted?)

- Latent print quality metrics

- Reverse latent searches (watch lists, UL files)

- Fully automated EFS extraction

- Fusion (latent prints, rolled and flat ten-prints)

- Latent fingerprint reference data

For More Information…

Web ➔ http://fingerprint.nist.gov/latent

Email ➔ latent@nist.gov

Thank you!

Questions?